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PROMOTION OF COST EFFECTIVENESS
IN A
MEDICAL INTENSIVE CARE UNIT

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PROMOTION OF COST EFFECTIVENESS IN THE MEDICAL INTENSIVE CARE UNIT

INTRODUCTION

Expenditure in the health care sector in Canada has remained relatively stable at between seven and eight percent of the gross national product for the last decade. However, health care expenditure is becoming more and more the target of political expedience for provincial governments attempting to reverse deficit spending. Global budget capping imposed on hospitals may be effective in reducing or controlling overall costs, but is not likely to improve the standard of care, allow necessary program development, or guarantee a more rational system of prioritization of existing and projected programs.

Although physicians to a great degree determine the amount and quality of expenditure in any given hospital based care delivery system, very little direct responsibility or incentive is provided to propel physicians towards more cost effective management. Although nursing is effective in monitoring major budget components in hospital based patient care units, administrative nursing personnel are not in a position to ensure cost effective expenditure in most categories other than nursing and support staff labour costs over which they have less than exclusive control.

Physician managers in this institution largely strive towards an optimum quality of care, and spend most of their time either providing care or competing for hospital resources to maintain and in many instances expand the level and quality of service in the area for which they are responsible. Improving cost effectiveness of existing service is much more difficult and time consuming, and until the present time arguably less rewarding for physician managers than attempting to increase the funding base for the provision of improved and expanded monitoring, diagnostic and therapeutic technologies. Expansion of resources is extremely unlikely to cause harm to patients and there is usually little effort required in obtaining evidence to suggest added patient benefits in the acquisition of new technologies. Identifying and reversing established practices which are either inefficient or provide little or no benefit is much more difficult and less rewarding for physicians. There is greater risk of reducing benefits to patients when one withdraws a therapeutic or diagnostic modality. For example, decreasing the use of an expensive drug for a particular indication where there is either no established benefit, or where a cheaper substitute is available, requires extensive research, discussion and probably consensus, in order to avoid adverse consequences to patients. Close monitoring in order to detect possible morbidity and compare a new practice to a preexisting widely accepted one becomes necessary with each individual change.

Since a closed unit with satellite support services is as close

to an ideal environment as possible for monitoring a variety of expenditure categories, the medical and nursing staff in the Medical Intensive Care Unit at the Health Sciences Centre would like to investigate the feasibility of implementing a Unitwide cost effectiveness program over an extended period of time which would include the following components.

- a) Comprehensive monitoring of patient care expenditure.
- b) Development and implementation of a process aimed at generating cost effective policies, which would allow participation by all Unit staff.

This process would be designed to restrict the potential of producing adverse patient outcomes as a result of altering previous practices. The emphasis would be placed on providing improved or equal quality of care for less expenditure.

- c) A comprehensive monitoring process to detect deteriorations and improvements in the quality of care potentially resulting from changes in a previously established practice.
- d) An incentive component designed to encourage ICU team members to generate and implement more cost effective policies which would include:
 - 1) potential for MICU staff to redistribute some component of the total cost savings toward improved patient care within the Unit;
 - 2) retention of a percentage of overall savings for the purposes of pharmacy, nursing and medicine staff development. Specifically, we would request that 50% of the total cost savings demonstrated during phase two of our study and projected over a one year period, would be placed in a fund to be administered and controlled by nursing, pharmacy and medicine in the Medical Intensive Care Unit according to guidelines to be developed by Unit personnel, and to be monitored by a committee including a representative from Hospital Administration.

It should be noted that despite extensive literature review there is a dearth of ICU research directed toward cost effectiveness and there is no single study as comprehensive as that which we are proposing.

OBJECTIVE

This study is designed to assess the effect of a structured multidisciplinary program directed toward improving or maintaining present standards of care within existing resources.

METHOD

A program evaluation approach will be utilized. Data will be collected on utilization of the specified resources prior to and following implementation of the program.

- 1) Setting: The Medical Intensive Care Unit at the Health Sciences Centre presently admits approximately 450 patients per year. These patients present with a variety of problems, including respiratory, cardiac and neurological disease, burns, and trauma. The majority of these patients require various life support systems including mechanical ventilation and hemodynamic manipulation. Medical care is provided by a designated physician team of staffmen and housestaff. Nursing staff are all graduates of or students in an Intensive Care Nursing Program. A satellite pharmacy located in the MICU operates on a 24-hour basis, utilizing a unit dose method of drug delivery. Blood gas processing, oxygen therapy plus ventilator setup, monitoring and maintenance is provided by a respiratory laboratory and assigned technologists. The multidisciplinary team includes an assigned dietician and physiotherapist. All patient care decisions are discussed and implemented through this team. The Unit is "closed" in that care is under the exclusive control of the designated MICU Attending and Unit staff.
- 2) Time Frame: The study will be completed in three stages. The first will consist of a six month period wherein utilization patterns will be monitored and documented. The program will then be introduced and a one month period of familiarization allowed. A follow up period of six months will be used to monitor and document the same data as in the pre-program period.
- 3) Patient Data: Inherent variation in all diagnostic categories renders calculation of individual ICU patient resource consumption impractical. Utilization of resources will thus be calculated on a 'total unit' basis. In order to assess population stability in relation to number of patients admitted, length of stay, acuity of illness and degree of intervention throughout the pre and post program periods, the following data will be collected on all patients:
 - i) admitting diagnosis and subsequent diagnosis
 - ii) length of stay
 - iii) daily APACHE scores*

- iv) daily TISS scores*
- v) morbidity/mortality.

* See Appendix

- 4) Resource Data: Three areas of consumption will be examined. Utilization data will be collected on pharmaceuticals, laboratory tests and procedures and disposable supplies.

- i) Pharmacy -- detailed patient records are currently compiled by the pharmacy. Calculation of exact amounts of drugs administered is possible from these records. These will be totalled for all drugs in approximately 18 categories.
- ii) Laboratories -- daily documentation of all laboratory tests, radiological and other diagnostic procedures is presently done by Unit Clerks. These records will be compiled to monitor utilization of hematology, biochemistry, microbiology, EKG, radiology and other laboratories. Approximately 150 tests and procedures have been identified as frequently ordered in the MICU and will be individually totalled.

Records of arterial, venous and expired blood gas analyses are currently compiled by the Respiratory Therapy Department and will be incorporated into the study data.

- iii) Disposable supplies -- a controlled supply of all disposable items is maintained within the MICU. Inventory will be taken at the beginning and end of each assessment period and records kept of all supplies ordered throughout each period.

Consumption of each of the above will be calculated by incorporating patient length of stay data and expressed as consumption per patient day. A cost per patient day will be derived by application of a constant cost to each of the pharmaceuticals, tests and supply items.

- 5) Description of the Program: A multidisciplinary team will be selected prior to implementation of the data collection. Representation from medicine, nursing, pharmacy, respiratory therapy, laboratories and Hospital Administration will be included. The objective of the team will be to examine the data on an ongoing basis, identify areas of possible alternative cost effective practise, develop policies related to these alternatives and implement these policies. All staff will be encouraged to submit ideas that may be utilized in an effort to meet the program's objective. A system of cash incentives for staff who submit ideas which lead to verifiable cost savings will be included. No policies will be implemented that do not receive approval from all members

of the program team. Whenever possible, any policy changes will be supported through information gained through the literature. No changes in practice will be implemented if it is felt there may be a negative impact on the present quality of patient care. Strict follow-up criteria will be developed for any policies where the effect on care is unknown.

- 6) Data Storage and Analysis: All data will be collected on hard copy, much of it as it is currently documented. Spreadsheets will be constructed and all data entered on a daily or weekly basis as appropriate.

RISK

1. There is the remote risk that particular policy changes would lead to increased patient morbidity. Because extensive literature review, discussion and consensus will be required during the development and prior to the implementation of any new policy, we feel that the possibility of adverse effects to patients is extremely small.
2. There is a risk that reducing overall expenditures would lead to future permanent cuts in the resources available for patients in the Medical Intensive Care Unit. However, since as a precondition of this study, a portion of cost savings incurred would be redistributed directly into the Medical Intensive Care Unit, the chances of restricting necessary resource acquisition and development in future years is minimal.

BENEFITS

1. We feel strongly that we can effect considerable cost savings.
2. We feel that the exercise of closely examining existing patterns of care delivery within our Unit will lead to improvement in many aspects of care, and the development of an overall healthy skepticism in assessing new technologies and "routine" patterns of monitoring and testing.
3. We feel that such an exercise would develop engrained assertive behaviours directed towards the development of future cost effective practice, for example, in the evaluation and purchase of disposable equipment.
4. The establishment of a fund directed towards staff development would have the potential of improving the work environment and act as an incentive in attracting staff to the Intensive Care Unit. A chronic problem, endemic to all intensive care units across the country, has been a shortage of qualified nurses and a high staff turn over rate. It is

of note that incentive benefits have not in the past been provided to nursing staff in our Intensive Care Units, and such a fund could be utilized for this purpose.

5. A process such as this study could only serve to strongly enforce the team concept of intensive care delivery and lead to overall improvement in staff morale, especially if mechanisms are in place to encourage wide participation in carrying out the entire program.
6. A Unit based patient data collection system designed specifically for ICU patients with the inclusion of APACHE and TISS Scores would be useful for patient group comparisons in clinical trials, and would be a valuable component of any quality assurance program developed in the Medical ICU.
7. Should this program succeed, a local expertise will have been developed and transfer of some or all aspects of the program could be effected through the Critical Care Coordinating Committee into other special care areas within the Institution.

BUDGET

It is not possible at this time to present a detailed budget for this program. Items to be included would be:

- 1) appropriate computer hardware, and software for a spreadsheet data base;
- 2) part-time keypunching services;
- 3) statistical analysis;
- 4) cash incentives for staff;
- 5) miscellaneous supplies.

We would request that funding for this study be provided by the Hospital on a cost recovery basis. In other words, the Hospital would expect to recover all costs from total savings projected over one year. This provides an incentive for the individuals designing and carrying out the study to limit the actual costs of the study.

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APPENDIX

Acute Physiology and Chronic Health Evaluation (APACHE)

A severity of disease classification system utilizing basic physiologic principles to stratify patients. Weighted scores are applied to 12 physiologic measurements, age and an evaluation of chronic health status. Higher scores reflect a more severely ill patient.

Therapeutic Intervention Scoring System (TISS)

An activity analysis measure that measures therapeutic effort by assigning weights to 57 therapeutic and diagnostic tasks performed in the ICU. The higher the number of TISS points, the greater the nursing time and effort involved.

Both scoring systems have been used extensively in the United States for comparative studies, cost analysis and prediction of outcome.

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GOALS

1. Develop and implement a process aimed at identification and reversal of established practices related to routine testing, patient monitoring and pharmacological intervention which are either inefficient or provide little or no benefit.
2. Effect patient care cost reductions through implementation of this process in the Medical Intensive Care Unit of the Health Sciences Centre.

PROBLEM STATEMENT

Physicians to a great degree determine the amount and quality of expenditure in any given hospital based care delivery system. Very little direct responsibility or incentive is provided to propel physicians towards more cost effective management. Although nursing is effective in monitoring major budget components in hospital patient care units, administrative nursing personnel are not in a position to ensure cost effective expenditure in most categories other than nursing and support staff labour costs over which they have less than exclusive control.

Physician managers in this institution largely strive towards an optimum quality of care, and spend most of their time either providing care or competing for hospital resources to maintain and in many instances expand the level and quality of service in the area for which they are responsible. Improving cost effectiveness of existing service is much more difficult and time consuming, and until the present time arguably less rewarding for physician managers than attempting to increase the funding base for the provision of improved and expanded monitoring, diagnostic and therapeutic technologies. Expansion of resources is extremely unlikely to detrimentally affect patient care and there is usually little effort required in obtaining evidence to suggest added patient benefits in the acquisition of new technologies. Identifying and reversing established practices which are either inefficient or provide little or no benefit is much more difficult and less rewarding for physicians. There is greater risk of reducing benefits to patients when one withdraws a therapeutic or diagnostic modality. For example, decreasing the use of an expensive drug for a particular indication where there is either no established benefit, or where a cheaper substitute is available, requires extensive research, discussion and consensus, in order to avoid adverse consequences to patients. Close monitoring in order to detect possible morbidity and compare a new practice to a preexisting widely accepted one becomes necessary with each individual change.

POPULATION/SETTING

The Medical Intensive Care Unit (MICU) at the Health Sciences Centre is currently operating eight beds and admits approximately 450 patients per year (exclusive of the Coronary Care Unit). These patients present with a variety of problems, including respiratory, cardiac and neurological disease, burns and trauma. The majority of these patients require various life support systems including mechanical ventilation and hemodynamic manipulation. Medical care is provided by a designated physician team of staffmen and housestaff. Nursing staff are all graduates of or students in an Intensive Care Nursing Program. A satellite pharmacy located in the MICU operates on a 24-hour basis, utilizing a unit dose method of drug delivery. Blood gas processing, oxygen therapy plus ventilator setup, monitoring and maintenance is provided by a respiratory laboratory and assigned technologists. The multidisciplinary team includes an assigned dietician and physiotherapist. All patient care decisions are discussed and implemented through this team. The Unit is "closed" in that care is under the exclusive control of the designated MICU Attending and Unit staff. A closed unit with satellite support services is as close to an ideal environment as possible for monitoring a variety of expenditure categories.

COST CATEGORIES TO BE CONSIDERED

- 1) laboratory investigations eg. arterial blood gases
 biochemistry tests
 blood cultures
 radiologic investigations
 electrocardiograms
- 2) disposable equipment eg. Swan Ganz catheters
 disposable transducers
 intravenous catheters
 dressings and surgical supplies
- 3) pharmaceuticals
- 4) blood products

INTENDED BENEFITS

1. We feel strongly that we can effect considerable cost savings.
2. We feel that the exercise of closely examining existing patterns of care delivery within our Unit will lead to improvement in some aspects of care, and the development of an overall healthy skepticism in assessing new technologies and "routine" patterns of monitoring and testing.

3. We feel that such an exercise would develop engrained assertive behaviours directed towards the development of future cost effective practice, for example, in the evaluation and purchase of disposable equipment.
4. A process such as this study could only serve to strongly enforce the team concept of intensive care delivery.
5. A unit based patient data collection system designed specifically for ICU patients with the inclusion of APACHE (Acute Physiology and Chronic Health Evaluation) and TISS (Therapeutic Intervention Scoring System) scores would be useful for patient group comparisons in clinical trials, and would be a valuable component of any quality assurance program developed in the Medical ICU.
6. Should this program succeed, a local expertise will have been developed and transfer of some or all aspect of the program could be effected through the Critical Care Coordinating Committee into other special care areas within the institution.

TIME FRAME

The study will be completed in three stages. The first will consist of a six month period wherein utilization patterns will be monitored and documented. The program will then be introduced and a one month period of familiarization allowed. A follow up period of six months will be used to monitor and document the same data as in the pre-program period.

BUDGET

We estimate that the cost of this project will be approximately \$40,000. This includes consultant fees, part-time labour costs and necessary computer hardware and software.